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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,387	10/02/2006	Gunther Leising	00366.000213.	1804

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EXAMINER	
HUBER, ROBERT T	
ART UNIT	PAPER NUMBER
2892	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/586,387	LEISING, GUNTHER	
	Examiner	Art Unit	
	ROBERT HUBER	2892	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 January 2011 and 02 May 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. The Examiner acknowledges the amendment(s) to the claims filed on May 2, 2011. The election restriction presented in the previous office action filed on March 30, 2011 is (are) hereby withdrawn. All of the presented claims filed on May 2, 2011 are considered below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 3, 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang (US 6,395,564, prior art of record) in view of Mueller et al. (US 6,417,019 B1, prior art of record).

a. Regarding claim 1, **Huang discloses a method for the producing a white LED of predetermined color temperature** (e.g. figures 2 - 4), **comprising**:

in a plurality of LEDs that includes uncoated blue LEDs or uncoated UV LEDs, or both (e.g. plurality of UV/blue LEDs as seen in figure 3, disclosed in col. 3, lines 7 - 9)**, the uncoated blue LEDs or uncoated UV LEDs each having a respective wavelength, the wavelength of the uncoated blue LEDs or uncoated UV LEDs not all being equal** (e.g. col. 3, lines 46 - 57 disclose the different LEDs to emit light of wavelengths not being equal (i.e. 445 nm, for the left LED, 455 nm for the middle LED, and 450 for the right LED)), **determining a wavelength of each respective uncoated blue LED or uncoated UV LED of the plurality of LEDs** (e.g. as disclosed in step 200 of figure 2)**;**

determining a single time a respective quantity of a conversion layer to be applied over each respective at least one uncoated blue LED or uncoated UV LED of the plurality of LEDs based on at least the wavelength determined (e.g. as disclosed in col. 4, lines 34 – 46 and seen in figure 2, step 300, which is a single time step, discloses determining the different quantities (doses) of phosphor to be formed as the conversion layer 32), **wherein the conversion layer includes a color conversion agent** (e.g. phosphor agent

disclosed in col. 3, lines 40 - 43)**, said conversion layer configured to absorb at least one of blue light and UV light, and emit light of longer wavelength** (conversion layer 32 made of phosphor particles, which is disclosed in col. 3, lines 58 – col. 4, line 3 discloses the light emitted from the device to be white light. It is well-known that white light comprises light of at least blue, green, and red. Since green and red light have longer wavelengths than blue light, the light conversion layer absorbs the blue/UV light and emits light of longer wavelength)**; and**

coating each respective uncoated blue or UV LED individually (as seen in figure 4, and step 300 of figure 2, and disclosed in col.3 lines 40 - 59), **with the conversion layer having the respective quantity determined that single time in said step of determining the quantity and concentration** (e.g. as disclosed in col. 3, lines 34 - 58)**, wherein the coated LED has the predetermined color temperature** (as disclosed in col. 3, lines 59 – col. 4, line 3, where the predetermined color temperature is 6000 K).

Huang is silent with respect to explicitly disclosing the concentration may also be determined for the light conversion layer. Huang states that the dose (quantity) of the light conversion layer may be determined (e.g. figure 2, step 300).

Mueller discloses that a concentration may be determined for a light conversion layer (col. 6, lines 19 – 26).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang such that determining the conversion layer comprises determining both the quantity and concentration since Huang discloses the conversion layer to convert light from an LED by adjusting the quantity (dose) of the conversion layer, and Mueller discloses that light from and LED may also be converted by adjusting the concentration of the conversion layer. One would have been motivated to include the adjustment of the conversion layer by adjusting the concentration in order to have more possibilities to adjust the conversion layer, thereby yielding a more comprehensive method of creating a light conversion layer.

b. Regarding claim 3, **Huang in view of Mueller disclose the method according to claim 1, as cited above, wherein the color conversion agent is applied by means of inkjet printing** (Huang: col. 3, line 49), **and wherein at least one of a quantity of said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength** (Huang: col. 6, lines 46 – 57 disclose adjusting the quantity (dose) of the phosphor particles in a conversion layer in response to desired wavelength of the LED).

c. Regarding claim 4, **Huang in view of Mueller discloses the method according to claim 1, as cited above, wherein at least one of a quantity of**

said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength (Huang: col. 6, lines 46 – 57 disclose adjusting the quantity (dose) of the phosphor particles in a conversion layer in response to desired wavelength of the LED). **Huang is silent with respect to disclosing the color conversion agent is applied by means of deposition in a gas phase.**

Mueller discloses the color conversion agent is applied by means of deposition in a gas phase (col. 8, lines 36 - 40 disclose various gas-phase deposition methods).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang such that the color conversion agent is applied by means of gas phase deposition since it was known in art that such methods may be used to apply color conversion agents, as disclosed by Mueller. One would have been motivated to use gas phase deposition since it was a well-known process with predictable results.

d. Regarding claim 8, **Huang in view of Mueller disclose the method according to claim 1, as cited above. Huang is silent with respect to disclosing the quantity of the conversion layer to be applied over each uncoated blue LED or uncoated UV LED is determined such that a constant dispensing volume of the applied conversion layer is present on each of the plurality of LEDs.**

However, Huang in view of Muller discloses that both the quantity and concentration of the light conversion layer may be applied over the uncoated blue or UV LEDs in order to create a white-light emitting device, as cited above with respect to claim 1. Furthermore, Huang recognizes that the difference in doses of the applied conversion layer is due to the differences of emitting wavelengths of the LEDS (e.g. col. 3, lines 40 – 59).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang in view of Mueller such that a constant dispensing volume of the applied conversion layer is present on each of the plurality of LEDs since Huang and Mueller recognize that the quantity and concentration of the light conversion layer is applied in order to create a white-light emitting device, and it has been held that when the prior art discloses the general conditions of the claimed invention, discovering the optimum or workable ranges involves only ordinary skill in the art. See MPEP 2144.05. One would have been motivated to apply a constant dispensing volume of the applied conversion layer on each of the LEDs in order to provide a white light emitting device when each of the plurality of LEDs has substantially the same emitting blue or UV wavelength.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Mueller et al., as applied to claim 1 above, and in view of Jones et al. (WO 00/12226, prior art of record).

Huang in view of Mueller disclose the method according to claim 1, as cited above, wherein at least one of a quantity of said color conversion agent and a concentration of said color conversion agent is selected depending upon the exact wavelength (Huang: col. 6, lines 46 – 57 disclose adjusting the quantity (dose) of the phosphor particles in a conversion layer in response to desired wavelength of the LED). **Huang and Mueller are silent with respect to the color conversion agent being applied by means of at least on of a dispenser and a stamp.**

Jones discloses a method of forming a white LED (e.g. figure 1) **in which a blue or a UV LED** (LED formed by electrode 12, layer 13 and electrode 14) **is coated with a conversion layer** (layer 16), **wherein the color conversion agent is applied by means of at least one of a dispenser and a stamp** (dispenser 1, disclosed on page 5, line 31).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang in view of Mueller to include the formation of the light conversion layer by means of a dispenser, as taught by Jones, since Jones discloses a method of forming a very similar structure to that of Mueller, but incorporates a formation of the conversion layer by means of a dispenser. One would have been motivated to use a dispenser since it is an effective way of forming a conversion layer on an LED, while reducing the harmful effects to the LED from lithography, as disclosed by Jones (page, 3, lines 17 - 26).

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Mueller et al., as applied to claim 4 above, and in view of Collins, III et al. (US 2003/0181122 A1, prior art of record).

Huang in view of Mueller disclose the method of claim 4, as cited above, wherein said deposition of color conversion agent in gas phase (Mueller: col. 8, lines 36 - 40 disclose various gas-phase deposition methods). Huang and **Mueller are silent with respect to a mask, such as a photomask, is produced, apertures of said mask being selected depending upon the exact wavelength.**

Collins, III discloses a method of forming a white LED (e.g. figures 1A – 1F) **in which a blue or a UV LED** (LED 18, disclosed in ¶ [0005] may emit blue light) **is coated with a conversion layer** (layer 22, disclosed in ¶ [0021]), **wherein a mask, in particular a photomask, is produced** (mask formed by photoresist layer 20, disclosed in ¶ [0020] and [0021]), **apertures of said mask being selected in dependence upon the determined wavelength** (e.g. as disclosed in ¶ [0016] and [0023], the aperture 20c is controlled by the light exposure)**.**

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang in view of Mueller to include a mask, in particular a photomask, is produced, as taught by Collins, III, since Collins, III discloses a method of forming a very similar structure to that of Huang and Muller, but incorporates a formation a photomask in order to form the light conversion layer on the LED. One would have been motivated to form a photomask since can be used to form a

controlled, patterned layer with various gas-deposition techniques (¶ [0004] of Collins, III).

The incorporation of the photomask of Collins, III with the method of deposition of the color conversion agent in the gas phase of Mueller renders obvious the limitation that the deposition of the color conversion agent in the gas phase is effected through the mask.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Mueller et al., as applied to claim 1 above, and in view of Wojnarowski et al. (US 6,483,196 B1, prior art of record).

Huang in view of Mueller disclose the method according to claim 1, as cited above, but is silent with respect to the color conversion agent being initially homogeneously applied and subsequently selectively removed by means of a laser in correlation with the exact wavelength.

Wojnarowski discloses a method of forming a white LED (e.g. figure 13, disclosed in col. 6, lines 44 - 50) **in which a blue or a UV LED** (LED 10) **is coated with a conversion layer** (layer 62 (not shown), disclosed in col. 6, lines 51 - 60), **wherein the color conversion agent is initially homogeneously applied** (e.g. as disclosed in col. 7, lines 1 – 8) **and subsequently removed by means of a laser in correlation with the exact wavelength** (e.g. as disclosed in col. 6, lines 55 – 60).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang in view of Mueller to include the

formation of the color conversion layer by applying it homogenously and subsequently using a laser to selectively remove it, as taught by Wojnarowski, since Wojnarowski discloses a method of forming a very similar structure to that of Huang and Mueller, but incorporates a formation of the conversion layer by homogeneous formation and subsequent laser removal. One would have been motivated to apply the method of Wojnarowski since one can control the variations of the light output of the device by selectively removing portions of the conversion layer that adversely affect the device, as discussed in Wojnarowski (col. 6, lines 55 – 60).

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller-Mach et al. (US 2002/0003233 A1) in view of Huang (US 6,395,564 B1, prior art of record).

Mueller-Mach discloses a white LED light source comprising (e.g. figure 3): **a blue LED or UV LED** (LED 2, disclosed ¶ [0026] to emit blue or UV light), **a conversion layer** (conversion layer 25, 26, 27, ¶ [0038]), **wherein the conversion layer has a thickness, above a particular one of the blue or UV LED, that is proportional to a determined wavelength of that particular blue or UV LED** (e.g. as disclosed in ¶ [0038], the thickness of the conversion layer is proportional to the wavelength of the LED), **and wherein the thickness of the conversion layer is increased for a respective longer wavelength and decreased for a respective shorter wavelength** (e.g. as disclosed in ¶ [0038]).

Mueller-Mach is silent with respect to disclosing a plurality of LEDs.

Huang discloses a white LED light source comprising (e.g. figure 4): **a plurality of blue LEDs or UV LEDs** (as seen in figure 4 and disclosed in col. 3, lines 8 - 10), **a conversion layer** (conversion layer 32a, 32b, and 32c, disclosed in col. 3, lines 46 - 57), **wherein the conversion layer has a thickness, above a particular one of the blue or UV LEDs, that is proportional to a determined wavelength of that particular blue or UV LED** (as disclosed in col. 3, lines 46 - 57, the dose (quantity) of the conversion layer is proportional to the wavelength of the LED. Furthermore, figure 4 clearly shows the thicknesses of the different conversion layer are different on each LED. As cited in col. 3, lines 46 - 57, the LEDs disclosed to have different determined wavelengths)

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the device of Mueller-Mach such that the device comprises a plurality of blue or UV LEDs since Mueller-Mach discloses the formation of a white light emitting LED structure, and Huang discloses that a while light emitting LED structure may comprise a plurality of blue or UV LEDs. One would have been motivated to use a plurality of LEDs in order to create a brighter light emitting structure.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Mueller et al. as applied to claim 1 above, and further in view of Muller-Mach et al.

Huang in view of Mueller disclose the method according to claim 1, as citied above, wherein the conversion layer has a thickness, above a particular

one of the blue or UV LEDs, that is proportional to a determined wavelength of that particular blue or UV LED (Huang: as disclosed in col. 3, lines 46 - 57, the dose (quantity) of the conversion layer is proportional to the wavelength of the LED. Furthermore, figure 4 clearly shows the thicknesses of the different conversion layer are different on each LED. As cited in col. 3, lines 46 - 57, the LEDs disclosed to have different determined wavelengths).

Huang and Mueller are silent with respect to disclosing the thickness of the conversion layer is increased for a respective longer wavelength and decreased for a respective shorter wavelength.

Mueller-Mach discloses the thickness of the conversion layer is increased for a respective longer wavelength and decreased for a respective shorter wavelength (e.g. as disclosed in ¶ [0038], the longer wavelength light enters a thicker conversion layer).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the method of Huang in view of Mueller such that the thickness of the conversion layer is increased for a respective longer wavelength and decreased for a respective shorter wavelength since Huang discloses using the conversion layer to create a while light LED, and Mueller-Mach discloses that longer wavelength light may be converted using thicker conversion layers. One would have been motivated to use a thicker conversion layer for a longer wavelength of light in order to use the wavelength conversion materials disclosed by Mueller-Mach, and create a white light emitting device with efficient conversion characteristics.

Response to Arguments

10. Applicant's arguments filed January 13, 2011 with respect to claim 1 have been fully considered but they are not persuasive. The Applicant argues that the combination of the supporting reference of Mueller et al. would change the principle operation of Huang, since Mueller apparently discloses an iterative process of determining the composition and concentration of the light conversion layer, and Huang discloses a single step process where the quantity of the light conversion layer before application of the layer. The Examiner respectfully submits that the process of determination of concentration of the light conversion layer of Mueller is not relied upon for the rejection of claim 1, but rather that the concentration itself may be a variable that is to be determined for the relevant properties of the light conversion layer. Therefore, it is not the process of Mueller relied upon and combined with Huang, but rather that the light conversion layer may have the concentration and quantity determined, and therefore modified to produce the desired process and product. The Examiner submits that the teaching of the concentration variation of the light conversion layer of Mueller will not destroy the intent purpose or principle operation of Huang, since Huang may determine the desired light conversion layer properties, including both the quantity and concentration, at the beginning of the disclosed process, and still yield the desired result. Since Huang already discloses to determine the quantity of the light conversion layer at the beginning of the process, and Mueller discloses that concentration is also a

relevant factor in the properties of the light conversion layer, the Examiner maintains that Huang in view of Mueller render obvious the claimed invention.

11. Applicant's arguments with respect to claim 7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT HUBER whose telephone number is (571)270-3899. The examiner can normally be reached on Monday - Friday (11am - 7pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Huber/
Examiner, Art Unit 2892
May 23, 2011